

## CLAIMS

We claim:

1. A system-on-chip imaging system, comprising:
  - an image sensor comprising a two-dimensional array of pixel elements, said image sensor providing pixel data representing an image of a scene;
  - a data memory, in communication with said image sensor, for storing pixel codewords, at least some of said pixel codewords being indicative of said pixel data;
  - a programmable lookup table, in communication with said data memory, for providing LUT codewords as output data; and
  - a processing unit, in communication with said data memory and said lookup table, for receiving LUT codewords from said lookup table and generating output image data, wherein a first pixel codeword stored in said data memory is used to index said lookup table for causing said lookup table to provide a respective LUT codeword to said processing unit, and said processing unit operates to perform one or more image processing functions in response to said LUT codeword.
2. The system of claim 1, wherein said pixel codewords are expressed in  $k$  bits and said lookup table comprises  $2^k$  entries.
3. The system of claim 1, wherein said data memory provides  $k$  bits for each pixel location, a first portion of said  $k$  bits being used to store CDS subtract values for each pixel location and a second portion of said  $k$  bits being used to store a pixel codeword for the respective pixel location.

4. The system of claim 3, wherein said processing unit programs said lookup table for selecting the number of bits in said first portion of said k bits.

5. The system of claim 1, further comprising:

an interface circuit between said image sensor and said data memory, said interface circuit preventing writing of said pixel data at a first location in said data memory when a pixel codeword stored at said first location indicates a reserved codeword.

6. The system of claim 5, wherein said reserved codeword comprises a defective pixel reserved codeword.

7. The system of claim 6, wherein when said lookup table is indexed by said defective pixel reserved codeword, said lookup table provides an LUT codeword instructing said processing unit to provide defective pixel correction.

8. The system of claim 5, wherein said reserved codeword comprises a masked pixel reserved codeword.

9. The system of claim 8, wherein when said lookup table is indexed by said masked pixel reserved codeword, said lookup table provides an LUT codeword instructing said processing unit to implement privacy mask processing function.

10. The system of claim 1, wherein said image processing functions performed by said processing unit comprises selection of one of a plurality of analog-to-digital conversion scheme for interpreting said pixel data.

11. The system of claim 1, wherein said image processing functions performed by said processing unit comprises an image processing algorithm for performing dark signal subtraction.

12. The system of claim 1, wherein each of said pixel elements of said image sensor generates analog signals representative of said image, and said image sensor further comprises an analog-to-digital converter for converting said analog signals to digital data as said pixel data.

13. The system of claim 1, wherein said image sensor comprises a two-dimensional sensor array of digital pixels, each of said digital pixels outputting digital signals as said pixel data.

14. A system-on-chip imaging system, comprising:

- an image sensor comprising a two-dimensional array of pixel elements, said image sensor providing pixel data representing an image of a scene;

- a data memory, in communication with said image sensor, for storing a first set of pixel codewords, at least some of said pixel codewords being indicative of said pixel data;

- a first programmable lookup table, in communication with said data memory, for providing a first set of LUT codewords as output data when said first lookup table is indexed by said first set of pixel codewords;

- a first processing unit, in communication with said data memory and said first lookup table, being operated to perform a first set of image processing functions in response to said first set of LUT codewords and providing output data in the form of a second set of pixel codewords;

an interface circuit, in communication with said first processing unit, for receiving said second set of pixel codewords;

a frame buffer, in communication with said interface circuit, for storing said second set of pixel codewords;

a second programmable lookup table, in communication with said frame buffer, for providing a second set of LUT codewords as output data when said second lookup table is indexed by said second set of pixel codewords; and

a second processing unit, in communication with said frame buffer and said second lookup table, being operated to perform a second set of image processing functions in response to said second set of LUT codewords and generating output image data.

15. The system of claim 14, wherein each of said pixel elements of said image sensor generates analog signals representative of said image, and said image sensor further comprises an analog-to-digital converter for converting said analog signals to digital data as said pixel data.

16. The system of claim 14, wherein said image sensor comprises a two-dimensional sensor array of digital pixels, each of said digital pixels outputting digital signals as said pixel data.

17. The system of claim 14, wherein said first set of pixel codewords are expressed in  $k$  bits and said first lookup table comprises  $2^t$  entries where  $t$  is less than  $k$ .

18. The system of claim 14, wherein said data memory provides  $k$  bits for each pixel location, a first portion of said

k bits being used to store CDS subtract values for each pixel location and a second portion of said k bits being used to store a pixel codeword for the respective pixel location.

19. The system of claim 18, wherein said processing unit programs said first lookup table for selecting the number of bits in said first portion of said k bits.

20. The system of claim 14, further comprising:

an interface circuit between said interface circuit and said frame buffer, said interface circuit preventing writing of said second set of pixel codewords at a respective location in said frame buffer when a pixel codeword stored at said location indicates a reserved codeword.

21. The system of claim 20, wherein said reserved codeword comprises a defective pixel reserved codeword.

22. The system of claim 20, wherein said reserved codeword comprises a masked pixel reserved codeword.

23. The system of claim 14, wherein said second set of image processing functions performed by said second processing unit comprises selection of one of a plurality of analog-to-digital conversion scheme for interpreting said pixel data.

24. The system of claim 14, wherein said second set of image processing functions performed by said second processing unit comprises an image processing algorithm for performing dark signal subtraction.